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EXAMINER	
HANNAHER, C	

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DATE MAILED: 06/29/95

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

☐ This application has been examined ☑ Responsive to communication filed on 5/19/1995 ☐ This action is made final.

A shortened statutory period for response to this action is set to expire three (3) month(s), _____ days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☑ Notice of References Cited by Examiner, PTO-892.
2. ☐ Notice of Draftsman's Patent Drawing Review, PTO-948.
3. ☐ Notice of Art Cited by Applicant, PTO-1449.
4. ☐ Notice of Informal Patent Application, PTO-152.
5. ☐ Information on How to Effect Drawing Changes, PTO-1474.
6. ☐ _____.

Part II SUMMARY OF ACTION

1. ☑ Claims 1, 4-17, 19-22 and 31-34 are pending in the application.
   Of the above, claims _____ are withdrawn from consideration.
2. ☑ Claims 2, 3, 18 and 23-30 have been cancelled.
3. ☐ Claims _____ are allowed.
4. ☑ Claims 1, 4-17, 19-22 and 31-34 are rejected.
5. ☐ Claims _____ are objected to.
6. ☐ Claims _____ are subject to restriction or election requirement.
7. ☐ This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.
8. ☐ Formal drawings are required in response to this Office action.
9. ☐ The corrected or substitute drawings have been received on _____. Under 37 C.F.R. 1.84 these drawings are ☐ acceptable; ☐ not acceptable (see explanation or Notice of Draftsman's Patent Drawing Review, PTO-948).
10. ☐ The proposed additional or substitute sheet(s) of drawings, filed on _____. has (have) been ☐ approved by the examiner; ☐ disapproved by the examiner (see explanation).
11. ☐ The proposed drawing correction, filed _____, has been ☐ approved; ☐ disapproved (see explanation).
12. ☐ Acknowledgement is made of the claim for priority under 35 U.S.C. 119. The certified copy has ☐ been received ☐ not been received ☐ been filed in parent application, serial no. _____ ; filed on _____.
13. ☐ Since this application apppears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
14. ☐ Other

EXAMINER'S ACTION

PTOL-326 (Rev. 2/93)

Part III DETAILED ACTION

Claim(s)—Rejection(s)/35 U.S.C. §103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103, the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 C.F.R. § 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of potential 35 U.S.C. § 102(f) or (g) prior art under 35 U.S.C. § 103.

3. Claims 1, 4-7, 14-17, 19, 20 and 21 are rejected under 35 U.S.C. § 103 as being unpatentable over Yin (US 4,521,688) and Westrom *et al.* (US 5,286,973).

With respect to independent claim 1, Yin discloses a gamma ray imaging system **20**. The object ABC emits non-focusable gamma rays. The system **20** of Yin comprises a coded mask **22**, a position sensitive detector **24**, an array of charge coupled devices **36** (see column 5, line 63), a signal processor **40** and a display **52**. In the art of imaging radiation emitting sources, it is known to provide a visual representation of an area in the field of view of the imaging system and superimpose a representative image of the radiation emitting source on the visual representation. See Westrom *et al.* at column 7, lines 33-42. In view of the improved ability of an operator of the imaging system to associate the location of the radiation emitting source with the visual aspects of the field of view, it would have been obvious to one of ordinary skill in the art to provide such a superimposition in the display **52** of the gamma ray imaging system of Yin.

With respect to dependent claim 4, the gamma ray imaging system of Yin further comprises means for transferring **34** the coded optical signal to the array **36**.

With respect to dependent claim 5, the gamma ray imaging system of Yin further comprises an array of optical fiber tapers (column 5, lines 50-56).

With respect to dependent claim 6, the gamma ray imaging system of Yin further comprises relay optics (column 5, lines 50-56).

With respect to dependent claim 7, the gamma ray imaging system of Yin further comprises an image intensifier **26**.

With respect to dependent claim 14, the gamma ray imaging system of Yin further comprises a scintillator material (column 5, line 17). The use of a crystal as the scintillator material would have been obvious to one of ordinary skill in the art as this is a typical choice for detecting gamma rays.

With respect to dependent claims 15 and 16, the screen **22** of the gamma ray imaging system of Yin is spaced from the position sensitive detector **24**. The choices of cross-sectional area and field of view are within the ordinary skill in the art in view of the intended application and the like.

With respect to independent claim 17, Yin suggests a method of generating a representative image of non-focusable gamma ray emitting source which would comprise the steps of providing a gamma ray imaging device **20** including a coded mask **22**, a position sensitive detector **24**, an array of charge coupled devices **36** (see column 5, line 63), and a signal processor **40**, situating the device so that a gamma ray emitting source ABC is within a field of view of the device, and displaying the image signal. In the art of imaging

radiation emitting sources, it is known to create a visual representation of an area in the field of view of the device and superimpose a representative image of the radiation emitting source on the visual representation. See Westrom *et al.* at column 7, lines 33-42. In view of the improved ability of an operator of the device to associate the location of the radiation emitting source with the visual aspects of the field of view, it would have been obvious to one of ordinary skill in the art to superimpose in the display **52** of the gamma ray representative imaging method suggested by Yin.

With respect to independent claim 19, Yin discloses a x ray imaging system **20**. The object ABC emits non-focusable x rays. The system **20** of Yin comprises a coded mask **22**, a position sensitive detector **24**, an array of charge coupled devices **36** (see column 5, line 63), a signal processor **40** and a display **52**. In the art of imaging radiation emitting sources, it is known to provide a visual representation of an area in the field of view of the imaging system and superimpose a representative image of the radiation emitting source on the visual representation. See Westrom *et al.* at column 7, lines 33-42. In view of the improved ability of an operator of the imaging system to associate the location of the radiation emitting source with the visual aspects of the field of view, it would have been obvious to one of ordinary skill in the art to provide such a superimposition in the display **52** of the x ray imaging system of Yin.

With respect to dependent claim 20, the x ray imaging system of Yin further comprises means for transferring **34** the coded optical signal to the array **36**.

With respect to dependent claim 21, the x ray imaging system of Yin further comprises an array of optical fiber tapers (column 5, lines 50-56).

4. Claim 8 is rejected under 35 U.S.C. § 103 as being unpatentable over Yin (US 4,521,688) and Westrom *et al.* (US 5,286,973) as applied to claim 7 above, and further in view of Yin (US 4,791,300).

With respect to dependent claim 8, the image intensifier **26** of the gamma ray imaging system of Yin ('688) is disclosed broadly. The use of an image intensifier comprising a multistage image intensifier tube is well known in the art of gamma ray imaging systems, as shown by Yin ('300). In view of the improved sensitivity, it would have been obvious to one of ordinary skill in the art to have the gamma ray imaging system of Yin ('688) comprise a multistage image intensifier tube as shown by Yin ('300).

5. Claim 9 is rejected under 35 U.S.C. § 103 as being unpatentable over Yin (US 4,521,688) and Westrom *et al.* (US 5,286,973) as applied to claim 1 above, and further in view of Fenimore *et al.* (US 4,209,780).

With respect to dependent claim 9, the uniform distribution of pinholes in a predetermined pattern described by Yin for the screen **22** at column 5, lines 6-8, may be considered to constitute a uniformly redundant array. Nevertheless, those of ordinary skill in the art recognize that the use of a coded mask identified as a uniformly redundant array is known in the art of gamma ray imaging systems as shown by Fenimore *et al.* In view of the effective performance in imaging non-focusable gamma ray emitting objects, it would have been obvious to one of ordinary skill in the art to provide a coded mask identified as a uniformly redundant array in the gamma ray imaging system of Yin.

6. Claims 10, 11, 22, 31 and 32 are rejected under 35 U.S.C. § 103 as being unpatentable over Yin (US 4,521,688) and Westrom *et al.* (US 5,286,973) as applied to claims 1 and 19 above, and further in view of Miller (US 5,235,191).

With respect to dependent claim 10, the position sensitive detector **24** of the gamma ray imaging system of Yin may comprise a scintillator material or phosphor. The use of a glass scintillator material is known, as described by Miller. In view of the effective performance in generating an optical signal in response to radiation impinging thereon, it would have been obvious to one of ordinary skill in the art to use a glass scintillator for the material of position sensitive detector **24** of the gamma ray imaging system of Yin.

With respect to dependent claim 11, Miller further discloses the use of a plurality of glass fibers. In view of the improved resolution afforded by the use of the fiber structure, it would have been obvious to one of ordinary skill in the art to include a plurality of glass fibers as the position sensitive detector **24** of the gamma ray imaging system of Yin.

With respect to dependent claim 22, the position sensitive detector **24** of the x ray imaging system of Yin may comprise a scintillator material or phosphor. The use of a glass scintillator material is known, as described by Miller. In view of the effective performance in generating an optical signal in response to radiation impinging thereon, it would have been obvious to one of ordinary skill in the art to use a glass scintillator for the material of position sensitive detector **24** of the x ray imaging system of Yin.

With respect to dependent claim 31, the thermoelectric cooling of an array of charge coupled devices in a radiation imaging system is known as shown by Miller. In view of the

improved operation, it would have been obvious to one of ordinary skill in the art to include a thermoelectric cooler for the array **36** in the gamma ray imaging system of Yin.

With respect to dependent claim 32, the thermoelectric cooling of an array of charge coupled devices in a radiation imaging system is known as shown by Miller. In view of the improved operation, it would have been obvious to one of ordinary skill in the art to include a thermoelectric cooler for the array **36** in the x ray imaging system of Yin.

7. Claim 12 is rejected under 35 U.S.C. § 103 as being unpatentable over Yin (US 4,521,688), Westrom *et al.* (US 5,286,973) and Miller (US 5,235,191) as applied to claim 11 above, and further in view of Walker (US 5,308,986).

With respect to dependent claim 12, the use of an external mural absorber coating in the construction of a fiber scintillator is known, as shown by Walker, column 7, lines 17-35. In view of the improved resolution, it would have been obvious to one of ordinary skill in the art to provide that the plurality of glass fibers suggested by Miller include an external mural absorber coating in the gamma ray imaging system of Yin.

8. Claim 13 is rejected under 35 U.S.C. § 103 as being unpatentable over Yin (US 4,521,688) and Westrom *et al.* (US 5,286,973) as applied to claim 1 above, and further in view of Walker (US 5,308,986).

With respect to dependent claim 13, the position sensitive detector **24** of the gamma ray imaging system of Yin may comprise a scintillator material or phosphor. The use of a plastic fiber scintillator material is known, as described by Walker. In view of the effective performance in generating an optical signal in response to radiation impinging thereon, it

would have been obvious to one of ordinary skill in the art to use a plastic fiber scintillator for the material of position sensitive detector **24** of the gamma ray imaging system of Yin.

9. Claim 33 is rejected under 35 U.S.C. § 103 as being unpatentable over Yin (US 4,521,688), Westrom *et al.* (US 5,286,973), Fenimore *et al.* (US 4,209,780), Miller (US 5,235,191) and Yin (US 4,791,300). The claimed features are found in the references as analyzed below. It would have been obvious to one of ordinary skill in the art to modify the references to include the recited features in view of the improved performance.

A gamma ray imaging system for providing an image of a gamma ray emitting source, which comprises:	Yin discloses a gamma ray imaging system **20** providing an image of a gamma ray emitting source ABC.
a coded mask including a uniformly redundant array, the coded mask receiving non-focusable gamma rays emitted by at least one source, the coded mask generating a coded shadow in response to the gamma rays received thereby;	Yin discloses a coded mask **22** receiving non-focusable gamma rays. Fenimore *et al.* discloses a coded mask identified as a uniformly redundant array.
a glass fiber scintillator situated with respect to the coded mask to allow the coded shadow generated by the mask to impinge thereon, the scintillator generating a coded optical signal in response to the coded shadow impinging thereon;	Yin discloses a position sensitive detector **24** which may comprise a scintillator material or phosphor. Miller describes the use of a glass scintillator material and the use of a plurality of glass fibers.
an optical fiber taper having a first end coupled to the scintillator, the optical fiber taper transferring the coded optical signal to an image intensifier;	Yin discloses an array of optical fiber tapers (column 5, lines 50-56).
a multistage image intensifier tube, having an input coupled to a second end of the optical fiber taper, the image intensifier amplifying and intensifying the coded optical signal received from the	Yin discloses an image intensifier **26**. Yin ('300) discloses the use of an image intensifier comprising a multistage image intensifier tube.

optical fiber taper to provide increased sensitivity to the system;

an array of charge coupled devices, the array being coupled to an output of the multistage image intensifier tube and generating a coded electrical signal in response to the coded optical signal received therefrom, the array being thermoelectrically cooled to improve a signal-to-noise ratio;

Yin discloses an array of charge coupled devices **36** (see column 5, line 63). Miller discloses the thermoelectric cooling of an array of charge coupled devices.

a digital signal processor, the digital signal processor receiving the coded electrical signal from the array of charge coupled devices and decoding the coded electrical signal to generate an image signal therefrom, the image signal being representative of an image of the non-focusable gamma ray emitting source; and

Yin discloses a digital signal processor **40**.

a monitor, the monitor being responsive to the image signal for displaying a representative image of the source.

Yin discloses a display **52**.

10. Claim 34 is rejected under 35 U.S.C. § 103 as being unpatentable over Yin (US 4,521,688), Fenimore *et al.* (US 4,209,780), Miller (US 5,235,191) and Westrom *et al.* (US 5,286,973).

With respect to independent claim 34, Yin suggests a method for scanning facilities having a plurality of potential radiation sources. The disclosed instrument **20** is a hand-held and portable radiation imaging device. The device **20** includes a coded mask **22**, a position sensitive detector **24**, and an array of charge coupled devices **36** (see column 5, line 63). The uniform distribution of pinholes in a predetermined pattern described by Yin for the

screen **22** at column 5, lines 6-8, may be considered to constitute a uniformly redundant array. Nevertheless, those of ordinary skill in the art recognize that the use of a coded mask identified as a uniformly redundant array is known in the art of gamma ray imaging systems as shown by Fenimore *et al.* In view of the effective performance in imaging non-focusable gamma ray emitting objects, it would have been obvious to one of ordinary skill in the art to provide a coded mask identified as a uniformly redundant array in the radiation imaging device **20** of Yin. The position sensitive detector **24** of the radiation imaging device of Yin may comprise a scintillator material or phosphor. The use of a glass scintillator material is known, as described by Miller. In view of the effective performance in generating an optical signal in response to radiation impinging thereon, it would have been obvious to one of ordinary skill in the art to use a glass scintillator for the material of position sensitive detector **24** of the radiation imaging device of Yin. Miller further discloses the use of a plurality of glass fibers. In view of the improved resolution afforded by the use of the fiber structure, it would have been obvious to one of ordinary skill in the art to include a plurality of glass fibers as the position sensitive detector **24** of the radiation imaging device of Yin. Yin further suggests the steps of transmitting the coded electrical signal **38** to a remote location (digital processor **40**) processing the coded electrical signal to generate an image signal and displaying the image signal. In the art of imaging radiation emitting sources, it is known to create a visual representation of an area in the field of view of the device and superimpose a representative image of the radiation emitting source on the visual representation. See Westrom *et al.* at column 7, lines 33-42. In view of the improved ability of an operator of the device to associate the location of the radiation

emitting source with the visual aspects of the field of view, it would have been obvious to one of ordinary skill in the art to superimpose in the display **52** of the gamma ray representative imaging method suggested by Yin. The transmission of electrical signals in a method of radiation imaging to a remote location is also shown by Westrom *et al.*

Response to Submission(s)

11. Applicant's arguments with respect to claims 1, 4-17, 19-22 and 31-34 have been considered but are deemed to be moot in view of the new grounds of rejection.

Conclusion

12. Papers related to Group 2500 applications **only** may be submitted to Group 2500 by facsimile transmission. Any transmission not to be considered an official response must be clearly marked "DRAFT". The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 34-35 (November 15, 1988). The Group 2500 Fax Center number is (703) 305-3594 or 308-1753.

13. *Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Hannaher whose telephone number is (703) 308-4850.*

Any inquiry of a general nature or relating to the status of this application should be directed to the Group 2500 receptionist whose telephone number is (703) 308-0956.

ch-6/26/1995

CONSTANTINE HANNAHER
PRIMARY EXAMINER
GROUP ART UNIT 2506